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*Personal Statement - Benjamin Guilfoyle*  
*University of Leicester - The First Supermassive Black Holes*

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I have always had an interest in the past. I remember even since I was young asking “*but what happened before that?*” This is a mentality I have carried with me to this day. I am currently in my final year of a BSc in Physics with Astrophysics at Maynooth University. Here I have turned that harmless question into near an obsession. I have pursued an education in physics with the aim of arming myself with the tools I need to delve into the dark history of the universe. I believe the study of black holes is key to understanding the universe.

Currently I am working on my BSc thesis analysing the surface photometry of the Seyfert galaxy NGC 7319, a type-2 Seyfert part of a larger set of colliding galaxies known as Stephan’s Quintet. Using data, I gathered at Haute-Provence Observatory (OHP), I plan to extract a brightness profile, and decompose it into its individual components. One of the most vital elements that can be derived from this is the mass of the black hole at the core of NGC 7319. Mass will be the key to unlocking aspects such as the temperature, shape, and age of the galaxy. I will also compare NGC 7319 to the surrounding galaxies in the quintet. From this I may unlock some of the fundamental differences in formation of Seyfert and regular galaxies.

Prior to this I spent 6 weeks working on data visualisation as part of the Clericus Project under Professor Thomas O’Connor. This project followed the history of 200+ years of priests who were ordained in St Patricks University. My role was to create functions and tools to aid in the visualisation and cataloguing of this data for both the scientific/historic community, as well as the general public. Clericus has been designed with the future in mind such that data can be added in the future to improve the existing models. This lead to the development of verbose requirements for Clericus to help ensure these tool could be used for years to come. Despite Clericus being non-physical I found it fascinating applying my skills outside the realm of physics. Being outside of physics also lead to the need to adapt and think creatively given the personal nature of the data. Furthermore, the analysis techniques developed as part of Clericus have proved invaluable in my degree.

Research into the first supermassive black holes is a project I feel will bring me along my next step into answering the question “*but what happened before that?*” Black Holes are a mysterious body that open many doors to our understanding of the universe, while also shattering our prior ideas of physics. The origin of these fascinating bodies can only lead to a richer understanding of the universe and a potential to answer some of the greatest mysteries in astrophysics. I believe my combination of physics, and history background will give me a unique perspective when answering this question. My history in data cataloguing and visualisation I believe will be a fantastic aid in working on this project, while also brining a deep passion for a history of the universe.